



Stormwater Design

For Wildlife Attractant Hazards



**Washington State
Department of Transportation**

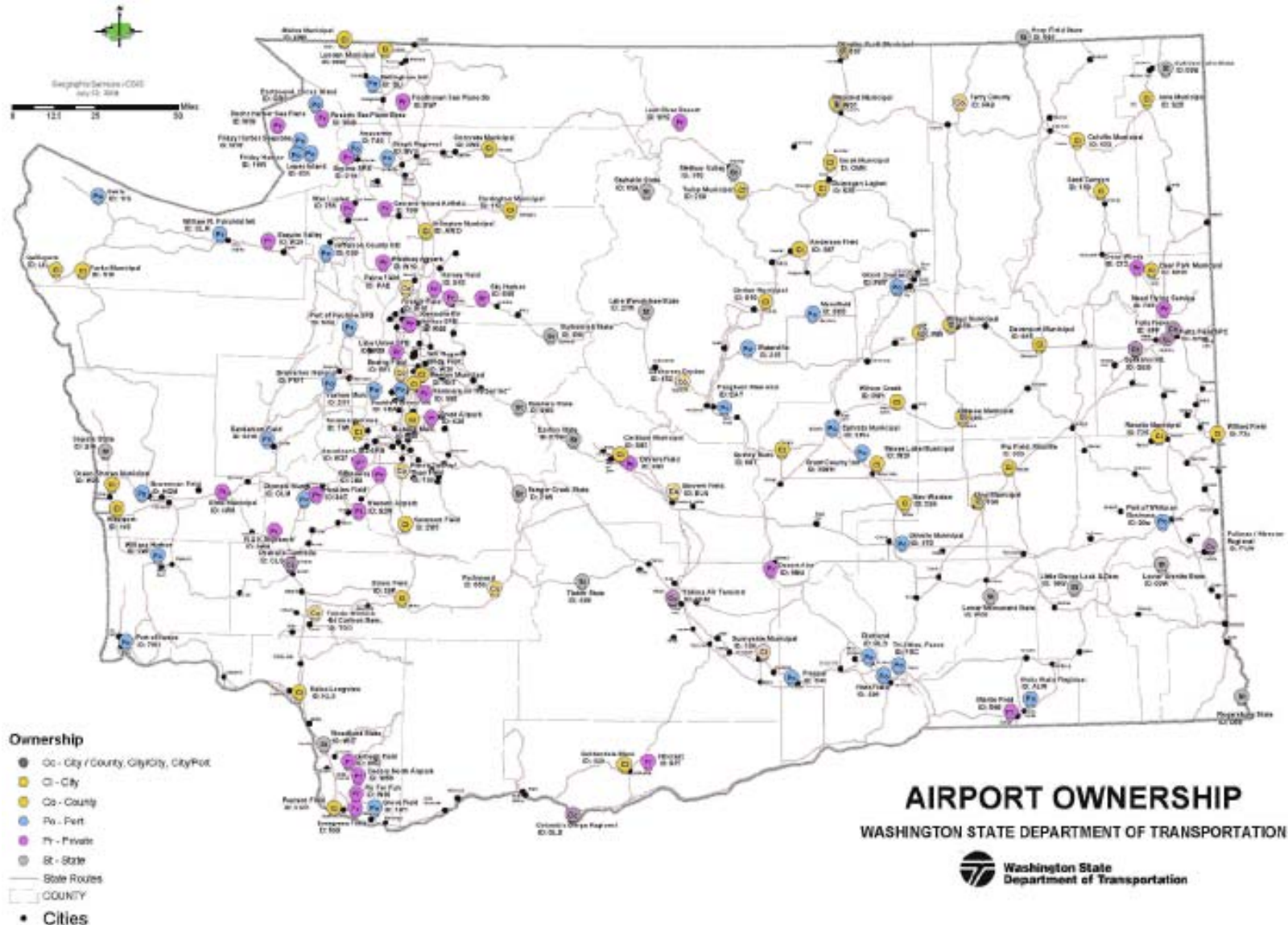
Agenda

- Project introduction
- Technical Memorandum
- Stormwater Manual concepts
- Example facility
- Schedule and Next Steps

FAA / WSDOT Partnership

- WSDOT responsible for many airports
- Grant from FAA to develop guidance
- Hired Herrera and Parametrix

FAA / WSDOT Partnership



Intro - Existing Stormwater Guidance

- Improve water quality and habitat
- Examples
 - Ecology manuals
 - Highway Runoff Manual
 - Stormwater Pollution Prevention Plan
- Existing guidance not suitable for airports



RT.12 Wet Pond

Dual-Celled Wet Pond Along I-5 in Clark County.

Technical Committee

- Purpose of committee
- Incorporation of feedback
- Members
 - Peter Birch, WDFW
 - Matt Breen, Spokane Airport
 - Lynn Deardorf, FAA
 - Elizabeth Leavitt, Port of Seattle
 - Mark Maurer, WSDOT
 - Christopher W. May, Battelle Marine Laboratory
 - Jeff Robb, Port Angeles Airport
 - Laurence Schafer, USDA

Regulations

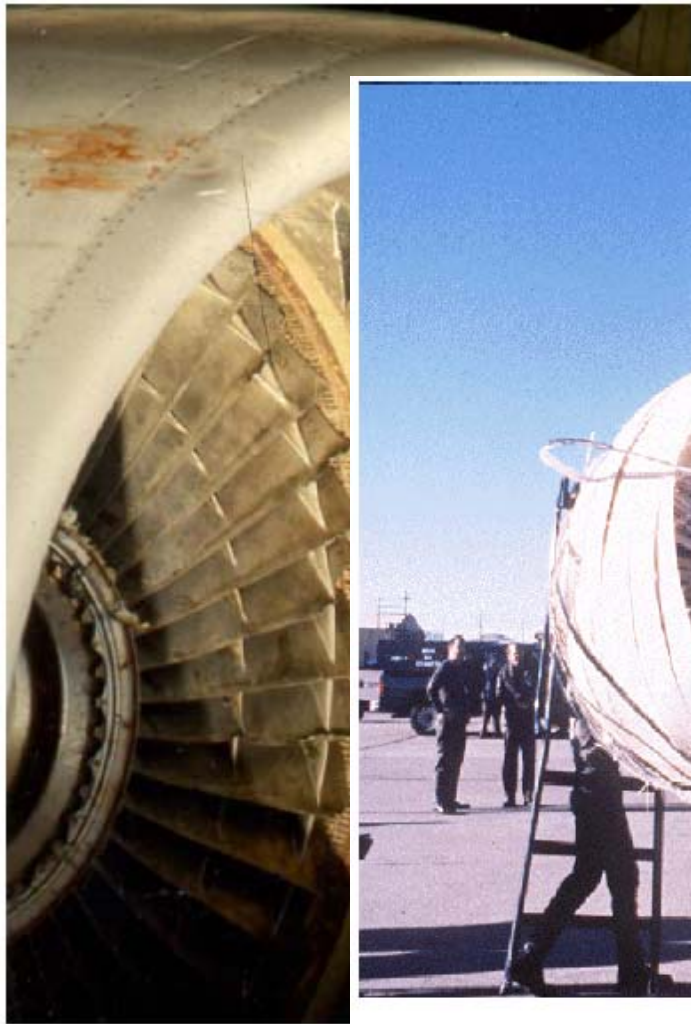
- Washington State Law
- National Pollutant Discharge Elimination System (NPDES) permits
- Washington stormwater regulations for new development
- Stormwater Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasure (SPCC)
- Washington growth management
- Endangered Species Act
- Clean Water Act, Section 401 and 404

Wildlife Tech Memo

- Purpose of Technical Memorandum
- Sources of information
- Technical Memo outline
- Technical Committee input
- Conclusions

Technical Memo Purpose

- Identify wildlife attractants at airports
- Evaluate stormwater design features
- Recommend changes to designs
- Direct stormwater manual efforts



During low level operations a red-tailed hawk, shattering the engine during takeoff of a Boeing-747 at an airport in New York, 1984. (Photo by USDA)



A Bell Jet Ranger 206-B helicopter struck this turkey vulture at an altitude of 600 feet. The bird penetrated the helicopter just below the squash plate. (Photo by Sgt. R. Ream, Michigan State Police)

Technical Memo Sources of Information

- Web search
- Government guidance
- Contact airports
- Scientific journals
- Feedback from technical committee

396

MARSH BIRD MANAGEMENT • *Brown and Dinsmore*

J. Wildl. Manage. 50(3):1986

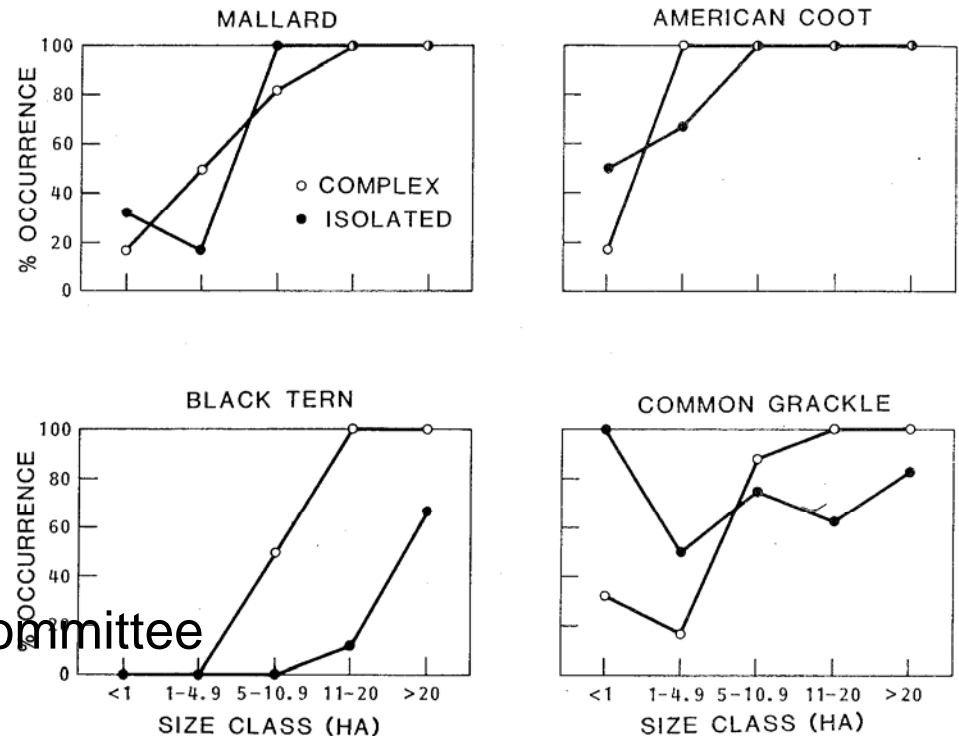


Fig. 2. Incidence functions (% occurrence-marsh size) of 4 Iowa marsh birds, comparing isolated and wetland complex sites, 1983 and 1984 data combined.

Tech Memo Outline

- Information sources
- Hazardous wildlife at airports
- Regulatory requirements and stormwater
- FAA stormwater guidance
- Airport stormwater management guidance
- Wildlife attractants at airports
- Mitigating wildlife hazards at airports
- Conclusions and recommendations
- Appendices

Airport Stormwater Management Guidance

- Wildlife hazard management plans
- Stormwater management plans
- Summary of existing stormwater design guidance for airports

Wildlife Attractants at Airports

- Vegetation
- Ponds
- Habitat quality
- Other attractants
- Attractants for Canada Geese

Vegetation

- Food and shelter
 - Fruit, nuts, seeds, also bulbs and roots
 - Height and density
 - Width of vegetated area
 - Isolated clumps for roosting
- Deterrents
 - Plant vegetation lacking food
 - Monoculture
 - Narrow or eliminate vegetation

Vegetation



Ponds

- Pond size
 - Interspersion of vegetation/water
 - Pond perimeter
 - Distance between ponds
-
- Deterrents
 - Smaller ponds
 - Straight perimeter

Ponds



Attractants: Habitat Quality

- Mix of vegetation and open water
- Short emergent vegetation
- Exposed shoreline
- Mud flats
- Deterrents
 - All open water or all vegetation
 - Shrubs along shoreline
 - Steep bank

Attractants: Habitat Quality



Attractants: Other

- Operations
 - Trash/food dumpster
- Other food sources
 - Frogs
 - Fish
 - Invertebrates
- Other shelter
 - Airplane engines
 - Building roofs

Attractants: Other



Attractants: Canada Geese

Table A-1. Documented Collisions of Wildlife and Aircraft in Washington and the United States

- Canada goose large bird

- Flocking behavior

- Collisions trail only gull

- Adaptable in food
 - Upland and aquatic
 - Wild and agricultural

- Prefer open sight lines

Species	No. of Collisions in Washington	Total No. of Collisions in United States
Unknown bird	238	19,730
Unknown bird - small	217	13,189
Unknown bird or bat	174	4,242
Gull	98	4,833
Canada goose	45	992
Unknown bird - medium	43	5,157
European starling	41	1,507
Killdeer	26	834
Sparrow	22	1,740
Unknown bird - large	22	1,499
Barn swallow	20	525
Duck	19	592

Deterrent Problems

- Change vegetation to shrub-scrub
 - Deters many large birds
 - Attracts other species, blackbirds
 - Difficult access for maintenance
 - Limit biologist access
- Lined ponds (no vegetation)
 - Limits food source, shelter
 - Exposed water may attract waterfowl
 - Quickly buried under sediment
 - No plant filtering of nutrients
- Frequent mowing
 - Deters many species
 - Some species prefer short grass (geese)
 - Raptors attracted to exposed prey

Technical Committee Input

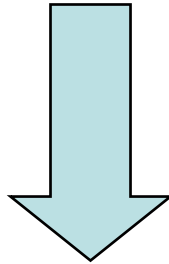
- Large number of regulations
- Need for clearly defined terms
- Differences between airports
- Need to integrate design with operations

Tech Memo Recommendations

- Factor attractants/deterrents into SW design
- Minimize attractants - open water
- Include deterrence – shrub/scrub
- Consider other airport needs including Health & Safety
- Acknowledge differences
 - Airports vs other land uses
 - Between individual airports

Key Point

Tech Memo



Stormwater Manual

Stormwater Manual Considerations

- Consistent with Ecology manuals
- Follow format of WSDOT HRM
- Don't repeat non-changing sections
 - Hydrology/hydraulics
 - Underground BMPs

BMPs Selected for Modification

- Infiltration
Bioinfiltration
- Biofiltration
Swales, Wet Swales, and
Filter Strips
- Ecology Embankment
- Wet Pool BMPs
Wet Ponds, Combined
Wet/Detention Pond,
Stormwater Treatment
Wetland



BMP and Stormwater Control Modifications

- Analysis and Methods
- Design Detail Changes
- Prohibitions, Restrictions, or Operational Considerations
- Deterrents and Obstructions
- Guidance Manual Text Modifications

BMP and Stormwater Control Modifications

- Analysis and Methods

Examples:

Flooding Duration

Drawdown Rate

Infiltration Safety Factors/Assumptions

BMP and Stormwater Control Modifications

- Design Detail Changes

Examples:

Change Detention Pond Slopes

Facility Configuration and Geometry

BMP and Stormwater Control Modifications

- Prohibitions, Restrictions, or Operational Considerations

Examples:

Prohibit the Use of Constructed Stormwater Wetlands or Wetponds

Emergency Access Considerations

Restrict Certain BMPs From Specific Operational Areas (i.e. RSA)

Consider Maintenance Requirements and Relationship to Operations

BMP and Stormwater Control Modifications

- Deterrents and Obstructions

Examples:

Netting

“Bird Balls”

Vegetation and Planting Patterns

BMP and Stormwater Control Modifications

- Guidance Manual Text Modifications

Examples:

Acceptable Plant Lists

Design and Material Specifications

Slope Stability and Soils

Conclusion & Next Steps

- Use Tech Memo to direct redesign
- Acknowledge airport differences but produce single set of guidance
- BMP changes include analysis as well as actual design
- Schedule to be done by August 2007